SHIGELLOSIS
(Bacillary Dysentery)

✓DISEASE AND EPIDEMIOLOGY

Clinical Description:

The most common symptoms of shigellosis are diarrhea (sometimes with blood and mucus due to inflammation of the bowel), fever, nausea, vomiting, and stomach cramps. Many cases present with watery diarrhea, however, some people who are infected may not have any symptoms at all. The disease is usually self-limiting, lasting 4–7 days. Dehydration may be severe, especially among infants and the elderly. Complications include convulsions (usually in young children, toxic megacolon, intestinal perforation, hemolytic uremic syndrome (HUS), and reactive arthropathy (Reiter syndrome).

Causative Agent:

Shigellosis refers to disease caused by any bacteria in the genus *Shigella*. *Shigella* are small, nonmotile, nonencapsulated, gram negative rods. There are four *Shigella* species: *S. dysenteriae, S. flexneri, S. boydii,* and *S. sonnei. S. dysenteriae, S. flexneri,* and *S. boydii* are further divided into serotypes and subtypes designated by Arabic numbers and lowercase letters (eg *S. flexneri* 2a).

Differential Diagnosis:

Salmonella, E. coli O157:H7, *Campylobacter, Yersinia enterocolitca,* and bacterial food poisoning may show similar signs and symptoms.

Laboratory identification:

Culture of feces or rectal swabs are the preferred method for *Shigella* diagnosis. Specimens for culture should be collected as soon as possible, ideally within the first few days of illness, and should be processed as soon as possible to ensure bacterial isolation. DFA may be useful in detecting the organism in small numbers, however, culture is still preferred. Serologic evaluation is generally not helpful because humoral antibodies do not develop before recovery.

> **UPHL:** The Utah Public Health Laboratory accepts stool specimens for isolation and serotyping. All isolates must be submitted to UPHL.

Treatment:

Antibiotics can effectively shorten the period of fecal excretion and can limit the clinical course of illness. The treatment of choice is a 5-day course of TMP-SMX. However, TMP resistance commonly occurs in strains acquired from outside the US. Persons with a travel history outside the US during the incubation period should receive ciprofloxacin, norfloxacin, or ofloxacin. Alternative drugs for children include amdinocillin and for mild cases, furazolidone. Azithromycin has successfully treated multi-drug resistant *Shigella* infection in adults.

Case fatality:

Shigellosis causes approximately 600,000 deaths throughout the world annually, mostly in children. The severity of the illness and the case-fatality rate are usually a function of the host (age and previous nutritional state) and the serotype, with the very young and the elderly experiencing the most severe illness. *S.* dysenteriae is usually associated with more severe disease and complications, with case fatality rates as high as 20% in hospitalized cases. *S.* sonnei has negligible case fatality rate except in immunocompomised hosts.

Reservoir:

Humans are the only significant reservoir for *Shigella*.

Transmission:

Shigellosis is the most communicable of the bacterial diarrheas and is transmitted via the fecal-oral route. The most common mode of transmission is person-to-person spread of the bacteria from a case or carrier. A very small dose (probably 10–200 organisms) of *Shigella* is sufficient to cause illness in many cases. Individuals shedding the bacteria may also contaminate food by failing to wash their hands before food handling activities, potentially causing large numbers of people to become ill. Person-to-person spread typically occurs among household contacts, preschool children in daycare, and the elderly and developmentally disabled living in residential facilities. Transmission can also occur from person to person through certain types of sexual contact (e.g., oral-anal contact). Flies can potentially spread the bacteria by landing on contaminated feces and then on food.

Susceptibility:

All people are susceptible. Host immunity is serotype-specific and protective against reinfection by the same serotype.

Incubation period:

The incubation period is usually 2-4 days, but can vary from 12 hours to 6 days. It can be up to one week for *S. dysenteriae*.

Period of communicability:

The disease is communicable for as long as the infected person excretes *Shigella* in his/her stool. This usually lasts for about four weeks from onset of illness. Effective antibiotic treatment has been shown to decrease the shedding period to a few days.

Epidemiology:

Shigellosis has a worldwide distribution. Secondary attack rates can be as high as 40% in households. Outbreaks occur in conditions of crowding and poor hygiene (prisons, daycares, institutions for children, mental hospitals, refugee camps) and among men who have sex with men. Outbreaks have also been caused by contaminated imported food. Over the past 10 years, Utah has averaged roughly 60 cases of shigellosis per year. In Utah, *S. sonnei* is the most commonly isolated serotype, followed by *S. flexneri*.

✓PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention
- Identify clusters or outbreaks of this disease and determine the source.
- Identify cases and sources to prevent further transmission.

Prevention:

Environmental Measures

Implicated food items must be removed from consumption. A decision about testing implicated food items can be made in consultation with the enteric epidemiologist at UDOH and UPHL.

The general policy of UPHL is to test only food samples implicated in suspected outbreaks, not in single cases (except when botulism is suspected). If holders of food implicated in single case incidents would like their food tested, they may be referred to a private laboratory that will test food or store the food in their freezer for a period of time in case additional reports are received. However, in certain circumstances, a single, confirmed case with leftover food that had been consumed within the incubation period may be considered for testing.

Personal Preventive Measures/Education

To avoid exposure to *Shigella*, persons should:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, and after changing diapers.
- Wash the child's hands as well as their own hands after changing diapers, and dispose of diapers in a closed-lid garbage can.
- Wash hands thoroughly and frequently when ill with diarrhea or when caring for someone with diarrhea. Hands should be scrubbed for at least 15–20 seconds after cleaning the bathroom; after using the toilet or helping someone use the toilet; after changing diapers; before handling food; and before eating.
- Keep food that will be eaten raw, such as vegetables, from becoming contaminated by animal-derived food products.

Discuss transmission risks that may result from oral-anal sexual contact. Latex barrier protection (e.g., dental dam) may prevent the spread of *Shigella* to a case's sexual partners and may prevent exposure to and transmission of other fecal-oral pathogens.

International Travel

The following recommendations can be helpful to travelers to developing countries:

- "Boil it, cook it, peel it, or forget it."
- Drink only bottled or boiled water, keeping in mind that bottled carbonated water is safer than non-carbonated bottled water.

- Ask for drinks without ice, unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.
- Eat foods that have been thoroughly cooked and are still hot and steaming.
- Avoid raw vegetables and fruits that cannot be peeled. Vegetables such as lettuce are easily contaminated and are very hard to wash well.
- Peel your own raw fruits or vegetables, and do not eat the peelings.
- Avoid foods and beverages from street vendors.

Chemoprophylaxis:
None.

Vaccine:
Experimental serotype-specific live oral vaccines and parenteral polysaccharide conjugate vaccines show protection of a short duration (1 year) against infection with the homologous serotype.

Isolation and quarantine requirements:
Isolation: Food handlers with shigellosis must be excluded from work. After diarrhea has resolved, food handlers may return to food handling duties only after producing 2 negative stool specimens, taken at least 24 hours apart. If a case was treated with an antimicrobial, the stool specimen should not be collected until at least 48 hours after cessation of therapy.
NOTE: A food handler is any person directly preparing or handling food. This can include a patient care or childcare provider.
Hospital: Enteric precautions.
Quarantine: Contacts who are food handlers and have diarrhea should be considered the same as a case and should be handled in the same fashion. In outbreak circumstances involving a facility, asymptomatic contacts who are food handlers may be required to submit stool specimens for testing.

✓CASE INVESTIGATION
Reporting:
All cases of shigellosis should be reported to public health.

Case definition:
Shigellosis (2005)
Clinical description
An illness of variable severity characterized by diarrhea, fever, nausea, cramps, and tenesmus. Asymptomatic infections may occur.
Laboratory criteria for diagnosis
Isolation of *Shigella* from a clinical specimen
Case classification
Suspect: Detection of *Shigella* from a clinical specimen using a non-cultured based method.

Probable: a clinically compatible case that is epidemiologically linked to a confirmed case.
Confirmed: a case that meets the laboratory criteria for diagnosis. When available, serotype characterization should be reported.

Criterion	**Case Definition**		
Clinical evidence	Confirmed	Probable	Suspect
Diarrhea		N	
Fever		O	
Bloody stools		O	
Mucus in stools		O	
Nausea		O	
Abdominal cramps		O	
Tenesmus		O	
Laboratory Evidence			
Isolation of *Shigella* from a clinical specimen	S		
Detection of *Shigella* from a clinical specimen using a non-culture based method			N
Epidemiologic Evidence			
Contact of a confirmed case of Shigellosis		O	
Member of a risk group defined by the public health authorities during an outbreak		O	
Notes: S = This criterion alone is Sufficient to classify a case. N = All "N" criteria in the same column are Necessary to classify a case. O = At least one of these "O" (Optional) criteria in each category (i.e., clinical evidence and laboratory evidence) in the same column—in conjunction with all "N" criteria in the same column—is required to classify a case.			

Comment

For users of the legacy National Electronic Telecommunications System for Surveillance (NETSS), laboratory-confirmed isolates are also reported via the Public Health Laboratory Information System (PHLIS), which is managed by the Foodborne and Diarrheal Diseases Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, CDC. The National Electronic Disease Surveillance System (NEDSS) or NEDSS compatible systems will eventually replace PHLIS; users of NEDSS or compatible systems which report to CDC should not report via PHLIS.
Both asymptomatic infections and infections at sites other than the gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported.

Case Investigation Process:

Report any illness to public health authorities that meets any of the following criteria:
1. Any person with *Shigella* isolated from a clinical specimen.

2. A person with diarrhea who is a contact of a person with confirmed *Shigella* infection or is a member of a risk group defined by public health authorities during an outbreak. Food handlers should be excluded from work until diarrhea has resolved and 2 stool specimens are negative.Assure isolate submission to UPHL.

Outbreaks:

CDC defines a food-borne outbreak as, "an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food". In order to confirm an outbreak of shigellosis, the same *Shigella* species must be isolated from clinical specimens from at least 2 ill persons or the species must be isolated from an epidemiologically implicated food. The source of the infection should be identified and measures to identify additional ill persons and/or to remove the source from consumers should be taken. Control of person-to-person transmission requires special emphasis on personal cleanliness and sanitary disposal of feces.

Identification of case contacts and management:

Neonatal Infection/ Maternal Infant Transmission

When neonate is less than 1 month of age, please use the following data entry procedure.

UTNEDSS/ Trisano Data Entry

- The mother is the case-patient, or "parent" CMR
  - Enter mother's medical record number in parent CMR
  - Enter mother's symptoms in the parent CMR
  - Enter mother's exposure history in parent CMR
  - Add attachments and lab report(s) for mother on parent CMR.
- Neonate is entered as a contact of the mother
  - Enter neonate medical record number as a contact of the mother
  - Enter neonate symptoms as a contact of the mother
  - Enter neonate exposure as a contact of the mother
  - Add attachments and lab report(s) for neonate as a contact of the mother
- Neonate may be promoted to own CMR as appropriate
- When searching UTNEDSS/ Trisano for name of mother or neonate, both CMRs should come up in search results

Daycare

Since shigellosis may be transmitted from person to person through fecal-oral transmission, it is important to follow-up carefully on cases of shigellosis in a daycare setting. General recommendations include:

- Children with *Shigella* infection who have diarrhea should be excluded until their diarrhea is resolved and they have 2 negative stool tests collected 24 hours apart and at least 48 hours after completion of antibiotic therapy, if antibiotics are given.
- Children with *Shigella* infection who have no diarrhea are subject to the same testing requirements above.
- Most staff in childcare programs are considered food handlers. Those with *Shigella* in their stool (symptomatic or not) can remain on site but must not

prepare food or feed children until their diarrhea is gone and they have 2 negative stool tests taken 24 hours apart (collected at least 48 hours after completion of antibiotic therapy, if antibiotics are given).

School

Since shigellosis may be transmitted from person to person through fecal-oral transmission, it is important to follow up on cases in school settings. General recommendations include:

- Students or staff with *Shigella* infection who have diarrhea should be excluded until their diarrhea is resolved.
- Students or staff with *Shigella* who do not handle food, have no diarrhea or have mild diarrhea, and are not otherwise sick may remain in school if special precautions are taken.
- Students or staff who handle food and have *Shigella* infection (symptomatic or not) must not prepare food until their diarrhea is gone and they have 2 negative stool specimens taken 24 hours apart (and collected at least 48 hours after completion of antibiotic therapy, if antibiotics are given).

Community Residential Programs

Actions taken in response to a case of shigellosis in a community residential program will depend on the type of program and the level of functioning of the residents.
In long-term care facilities, residents with shigellosis should be placed on standard (including enteric) precautions until their symptoms subside and they have 2 negative stool tests for *Shigella* taken 24 hours apart and collected 48 hours after completion of antibiotic therapy. Staff members who give direct patient care (e.g., feed patients, give mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions. In addition, staff members with *Shigella* infection who are not food handlers should consider not working until their diarrhea is resolved.

In residential facilities for the developmentally disabled, staff and clients with shigellosis must refrain from handling or preparing food for other residents until their diarrhea has subsided and they have 2 negative stool specimens for *Shigella* taken 24 hours apart (and collected at least 48 hours after completion of antibiotic therapy, if antibiotics are given). In addition, staff members with *Shigella* infection who are not food handlers should consider not working until their diarrhea is resolved.

✓ REFERENCES

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